

Locking compression plates (LCP) & less invasive stabilization system (LISS).

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The development of the less invasive stabilization system (LISS) for the management of distal femoral fractures and proximal lateral tibial fractures was the technical answer to the clinical need of a less invasive plate osteosynthesis. The LISS is an anatomically pre-shaped internal fixator which can be inserted percutaneously by means of an adaptable insertion guide. In combination with a trocar assembly, the handle also serves as an aiming instrument for an exact percutaneous placement of screws. Based on extensive anatomical studies, the orientation of the individual screws is predetermined. As the LISS plate is anatomically pre-shaped, small variations between the plate shape and the anatomical topography can be encountered. To compensate these variations, special locking head screws have been developed. A conical outer thread of the screw head and an inner thread of the plate hole, locks the screw into the plate, as soon as the threaded screw head engages the threaded plate hole and the screw are tightened together. The locking head screw locks the distance between the bone and the plate as well as the screw axis relative to the plate-hole axis (angular stability). To facilitate the placement of screws through small skin incisions, the LISS locking head screws are self tapping and self drilling. The self drilling feature can only be implemented, while the screws are placed unilaterally.

In contrast to any previous osteosynthesis plate, the LISS plate is forged out of a titanium alloy and stainless steel, to improve cyclic load to failure. Again this production process can only be used, when the plates are not shaped by the surgeon in situ.

The LISS for the distal femur (LISS DF) and the proximal lateral tibia (LISS PLT) are implants that act as splints. The LISS acts mechanically as an internal fixator. It is a 100% locked internal fixator, because only locking head screws (LHS) are used. The LISS is designed for percutaneous insertion. A less invasive approach is also possible. Important is a closed, indirect reduction and a partial splinting of the fracture zone.

The development of the locking compression plate (LCP)

The LISS was originally designed as a device that would only accommodate locking head screws; because all of the plate holes are threaded. However, clinicians found that this technology was too restricted in some cases and that an all-purpose implant system would offer greater flexibility. Development work in this area, with multidisciplinary collaboration among clinicians, developers and manufacturing engineers led to the concept of a combination hole, combining the use of compression –and locking head screws in one hole configuration.

The LCP hole also makes it possible to insert different screw types into the same plate, so that the surgeon is able to choose the type depending on intraoperative requirements. In retrospect, combining two completely different anchorage techniques into a single implant was a logical approach and a straightforward, practical solution. With the LCP, the surgeon has two plating methods to choose from and is able to select the more appropriate of the two techniques. With its newly designed combination hole, the LCP makes it possible to implement the principles of both compression and splinting for fracture stabilization in the same implant. The option of using the LCP either as a compression plate or as an internal fixator, provides ideal plate anchorage that can be adapted to requirements of the individual case. This significantly extends the range of indications in minimal invasive plate osteosynthesis.